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ABSTRACT

A study examined the age-related differences in impersonal (objective) and personal (subjective) styles of thinking and the influences these differences have on traditional cognitive measures. Data were obtained from two 2-hour interviews with 333 participants in their homes, at senior centers, or on a university campus. All participants were given a battery of measures of memory, problem solving, fluid and crystallized intelligence, and affective functioning. Participants were classified as young adults (17-22 years); middle-aged adults (40-50 years); old adults (60-70); and old-old adults (75-99 years). Participants' responses were scored on a variety of dimensions, included the divisions of "intrapersonal," "within family," "interpersonal," "impersonal," and "other." A multivariate analysis of variance (MANOVA) revealed significant age-related differences in the frequency of division types. Intrapersonal divisions were significantly more frequent in old and old-old adults than in young adults, whereas interpersonal divisions were significantly more frequent in young adults. Consistent with previous research, the sample demonstrated the "classic aging pattern" in cognitive performance. The older adults were more likely to use an intrapersonal type of reasoning, whereas the young adults displayed more abstract reasoning. The study observed that various patterns of thinking were also found within age groups, leading to the conclusion that styles of thinking may reflect age but are not limited to age. (33 references) (KC)

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# From Structure to Content: Evidence for Styles of Thinking in Adulthood

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Running Head: STRUCTURE TO CONTENT

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# From Structure to Content: Evidence for Styles of Thinking in Adulthood

Organismic approaches to cognitive development have emphasized the objective, rational, and logical nature of mature adult cognition. Exemplifying this approach, Piaget's (1970) theory stresses the "objectification" of thought during development from the action schemes (subject-focused logic) of pre- and concrete operations, to the abstract, scientific schemes (object-focused logic) of formal operations.

Piaget theorized that mature adult thinking is attained in adolescence; in this view, mature adult thinking is abstract and logical. Beyond adolescence, however, researchers have found that older adult thinking becomes less abstract and logical, and increasingly content-specific and practical (Cheng & Holyoak, 1985; Denney & Palmer, 1981; Dixon & Baltes, 1986; Rybash, Hoyer, & Roodin, 1986; Sinnott, 1984).

Piaget described young adult thinking as formal operational; Piagetians, neo-Piagetians, and contextual theorists have described adult thinking as dialectical (Arlin, 1975; 1984; Basseches, 1984; Chandler, 1975; Commons, Richards & Kuhn, 1982; Edelstein & Noam, 1982; Kramer, 1983; Kramer & Woodruff, 1986; Labouvie-Vief, 1980, 1982; Pascual-Leone, 1983, 1984; Riegel, 1973; Sinnott, 1984, 1989). The term dialectic, however, has many meanings (Reese, 1982), and in the cognitive aging literature these meanings are diverse and include relativistic thinking (Chandler, 1975; Kramer & Woodruff, 1986; Sinnott, 1984), concrete-pragmatic thinking (Labouvie-Vief, 1980), problem finding (Arlin, 1975), and intersystematic thinking (Pascual-Leone, 1983). Dialectical thinking, then, may be defined in a number of different ways; nevertheless, many definitions include an emphasis on practicality and concreteness.

Many researchers have attempted to account for these observed differences. Organismic theorists view dialectical thinking as a stage beyond formal operations (e.g., Kramer & Woodruff 1986), but contextual theorists view dialectical thinking as a different "style" of thinking rather than a higher stage (Leontyev, 1974). Cognitive changes from formal operations to dialectical thinking may be attributed to declines in underlying psychological processes (Horn & Cattell, 1967; Pascual-Leone, 1983), cumulative health trauma (Hertzog, Schaie, & Gribbin, 1978), an overreliance on automatized processing (Pascual-Leone, 1984), or differences in adulthood contexts (Gribbin, Schaie, & Parham, 1980).

Pascual-Leone (personal communication, September, 1989) suggests that content is an important component of older adult's thinking. That is, old adults may rely on personal experiences, automatized skills, and content when solving problems because of declines in psychological processes.

The goal of the present study was to test whether personal experiences are more salient to older adult thinking, as well as to examine the variables that are related to age differences in adult cognitive development. Specifically, this research examined the age-related differences in impersonal (objective) and personal (subjective) styles of thinking and the influences these differences have on traditional cognitive measures.

## Method

### Subjects

Four hundred participants were tested in the project in four age groups selected on the basis of Pascual-Leone's (1983) theory of developmental stages (young adults, 17-22 yrs; middle-aged adults, 40-50 yrs; old adults, 60-70 yrs; and old-old adults, 75-99 yrs). The participants were interviewed as part of a larger project investigating cognitive development in adulthood (Reese, Puckett, & Cohen, 1990). However, data from 67 participants were spoiled, unscoreable, or incomplete on the critical task and were therefore excluded from these analyses. Thus, 333 participants provided useable data and are included in the present analyses. Table 1 summarizes demographic information about the sample.

### Procedure

The participants were interviewed in two, 2-hour sessions in their homes, at local senior centers, or on the campus of a mid-Atlantic university. All participants were given a battery of measures of memory, problem-solving, fluid and crystallized intelligence, and affective functioning. Only a subset of these measures is included in the present study. Each participant received $20.00 for participating.

### Instruments

Divisions task. The participant was asked to sort 32 cards. Each card identified a different everyday life event (e.g., being retired, being fired, getting married, being divorced, having good health [Reese & Smyer, 1983]). One of the 32 cards was selected by each participant as the "target card"; the participant was then asked to sort the cards into two equal piles: (a) the target pile, in which all the cards had something in common with the target card; and (b) the non-target pile, in which all the cards had something in common with each other, but not in common with the target card. After each division, the non-target pile was discarded and the participants continued to divide the remaining cards into two equal piles, each time discarding the non-target pile, until only the target card remained (a total of five divisions).

Digit Span. The forward and backward subscales of the Weschler Adult Intelligence Scale-Revised (WAIS-R) were given to each participant using standard administration procedures (Weschler, 1981).

Letter Sets. The Letter Sets test is a measure of inductive reasoning and fluid intelligence (Horn, 1988). It requires finding a rule that makes four of five 4-letter combinations alike (Eckstrom, French, Harman, & Derman, 1976).

Vocabulary. Participants were asked to define 35 words from the WAIS-R vocabulary subscale (Weschler, 1981).

Houseplants task. The Houseplants task (Kuhn & Brannock, 1977) is a test of formal operational reasoning within a real life context. Participants were shown four sketches of houseplants, each with different combinations of (a) plant food (dark or light), (b) water (large or small glass), (c) and leaf lotion (present or absent). Participants were asked to predict how well a plant that received a new combination of plant food and water would turn out.

Scoring

Divisions task. Participants' verbal responses to the divisions task were recorded and later transcribed. The protocols were scored on a variety of dimensions, including the inferred basis of the divisions: intrapersonal divisions, within-family divisions, interpersonal divisions, impersonal divisions, and other divisions. Examples of intrapersonal divisions are "healthy versus ill," "events that are personally stressful versus events that are not stressful," and "events that have to do with me versus events that have nothing to do with me." Examples of within-family divisions include "things parents do versus things that parents don't do," "these have to do with being a father versus these have to do with being a son," and "husband versus wife." Examples of interpersonal divisions include "employer versus employee," and "work related versus not work related." Impersonal divisions include "good versus bad," and "cause versus effect." Responses that were not scoreable were placed in an "other" category.

Predominant division type. For some analyses, participants were grouped on the basis of modal division type. For example, participants who made three or more interpersonal divisions, were classified into an interpersonal divisions group.

Digit Span and Vocabulary. Standard scoring procedures were used for the Digit Span and Vocabulary tests (Weschler, 1981); however, separate scores were recorded for the forward and backward Digit Span subscales.

Letter Sets. Standard scoring was used for the Letter Sets test (Eckstrom, French, Harman, & Derman, 1976). The maximum score possible was 30.

Houseplants task. A modified version of Kuhn and Brannock's (1977) scoring system was used for the Houseplants task. Scores could range from 0 (experiential; no isolation of variables) to 4 (logical isolation of the operative variable and exclusion of the inoperative variables).

## Results

### Age Differences on Cognitive Measures

A multivariate analysis of variance (MANOVA) revealed significant age-related differences on the Letter Sets task, forward and backward subscales of the Digit Span test, and Vocabulary test (all *p*s < .01), all in the expected direction. Table 1 summarizes these results. In general, these findings are comparable to the findings of previous researchers (e.g., Baltes, Dittman-Kohli, & Dixon, 1984); thus our sample is comparable to other samples of adults in the cognitive aging literature.

### Age Differences on Divisions Task

A MANOVA revealed significant age-related differences in the frequency of division types (see Figure 1). Univariate analyses indicated age differences in the frequency of intrapersonal divisions ($F_{(3, 329)} = 5.58$, $p < .001$), (b) interpersonal divisions ($F_{(3, 329)} = 8.40$, $p < .001$), (c) impersonal divisions ($F_{(3, 329)} = 3.46$, $p < .05$), (d) other divisions ($F_{(3, 329)} = 5.75$, $p < .001$), but not (e) within-family divisions ($p < .098$). Table 2 contains the descriptive statistics relevant to these analyses.

Pairwise comparisons using the Scheffé method indicated that intrapersonal divisions were significantly more frequent in old and old-old adults than in young adults (*M*s = 2.24, 2.23, and 1.30, respectively, $p < .05$). Conversely, interpersonal divisions were significantly more frequent in young adults than old-old and old adults (*M*s = 1.88, 1.03, and 0.75, respectively, $p < .05$); the old-old adults also differed from the middle-aged adults (*M*s = 0.75 and 1.51, $p < .05$). Young adults differed from the old-old adults in the frequency of impersonal divisions (*M*s = 0.34 and 0.86, $p < .05$). Lastly, "other" divisions were significantly more frequent in old-old adults than in both the middle-aged and young adults (*M*s = 0.57, 0.19, and 0.13, respectively, $p < .05$).

### Predominant Division Type and Cognitive Performance

Participants were classified into groups based on their predominant division type, and a multivariate analysis of covariance (MANCOVA) with age as the covariate was performed using the cognitive measures as dependent variables. For this analysis, twenty-seven participants were excluded because of missing data on one or more of the dependent variables.

The multivariate *F* was significant, and follow-up univalve analyses revealed significant differences on (a) Letter Sets, $F_{(4, 300)} = 3.89$, $p < .01$, (b) Digit Span backward, $F_{(4, 300)} = 3.80$, $p < .01$, and (c) vocabulary, $F_{(4, 300)} = 4.74$, $p < .001$.

Pairwise comparisons using the Scheffé method indicated that the impersonal divisions group differed from the intrapersonal, within-family, and "other" divisions groups on

Letter Sets (*M*s = 18.52, 13.68, 13.02, and 8.32, respectively, *p* < .05). Additionally, "other" divisions group differed from the remaining groups on Letter Sets (*p* < .05). The interpersonal divisions group differed from the within-family divisions group on backward Digit Span (*M*s = 6.96 and 5.35, *p* < .05). The impersonal divisions group differed from the within-family divisions group on vocabulary (*M*s = 58.71 and 47.52, *p* < .05).

## Discussion

### Age Differences on Performance Measures

Consistent with previous research, our sample demonstrated the "classic aging pattern" in cognitive performance. This pattern is characterized by the divergence between fluid (inductive reasoning and effortful processing) and crystallized (vocabulary) abilities.

### Age Differences on Divisions Task

In addition to these cognitive differences, younger adults differed from older adults on the Divisions task. In particular, young and middle-aged adults were more likely than older adults to use interpersonal types of divisions. The predominance of interpersonal divisions may reflect the contexts in which these age groups are embedded. Interpersonal relations may be more salient in educational and work settings, which are common contexts for these age groups; that is, social relations and interpersonal problem-solving are characteristic of school and work settings. This interpersonal style of responding emphasizes public, social relations rather than private, personal relations and is context-focused rather than self-focused. This type of responding is different from within-family divisions in that the latter type emphasizes personal, family experiences rather than impersonal or social relations.

Young adults were also more likely than old-old adults to use an impersonal type of divisions. Impersonal responding reflects an objective, abstract style of thinking, which may be adaptive for young adults in school contexts. Organismic perspectives would predict a predominance of impersonal responding in young adulthood; however, the results of the divisions task do not support this assertion. The reasons for this discrepancy may be that the divisions task does not adequately measure this style of responding, or the method of coding was not sensitive to abstract responses. In either case, young adults performed better than all other age groups on the Letter Sets test and better than the old and old-old on the Houseplants task, both of which are measures of logical reasoning.

An alternative explanation for the discrepancy is that age differences in interpersonal divisions partly overlap with impersonal divisions because the content of interpersonal divisions was impersonal rather than personal. This possibility is supported in that the impersonal group's performance was significantly better than that of the

intrapersonal, within-family, and other divisions on the Letter Sets test, but did not differ from that of the interpersonal group. In other words, impersonal and interpersonal styles of responding did not differ on our measure of inductive reasoning.

Old and old-old adult were more likely than young adults to use an intrapersonal type of divisions. The frequency of intrapersonal responding in old and old-old adults reflects a self-focused style of thinking. This style of responding reflects personal experiences, abilities, and concerns about the self. The predominance of this type of responding in the old adults and, to a lesser degree, the old-old adults may reflect the contexts in which these age groups are embedded. That is, these populations may be more concerned with personal issues and self-reflection rather than abstract, impersonal issues (Labouvie-Vief, DeVoe & Bulka, 1989).

Old-old adults were significantly more likely than the other groups to use an "other" type of division. Examination of the "other" category indicated that it reflects a disorganized divisions style in which the participant named the items or did not divide the items. Many of these participants provided a personal narrative and recounted personal experiences in response to the items.

Predominant Division Type and Cognitive Performance

The performance on the cognitive measures differed for the divisions groups in expected directions. The effects of division type on cognitive measures were significant even with the effects of age removed, and they paralleled age group effects. Thus, age does not solely account for differences in cognitive measures. Style of responding, then, may be used to index patterns of cognitive abilities. However, since performance on the cognitive measures varied with divisions group membership even with the effects of age removed, this task may also index the contexts to which the individuals are adapting. Impersonal and interpersonal styles of responding reflect formal and objective thinking and were most frequent in young and middle-aged adults. The demands of work and educational settings may nurture this style of responding as a mode of adaptation. Similarly, intrapersonal and within-family styles of responding reflect dialectical thinking and were most frequent in the old and old-old adults. These styles of responding may be adaptive to the demands of retirement and disengagement. Different styles of responding, then, are age-related but not age-determined.

Differences in cognitive performance among divisions types with the effects of age removed may indicate that observed age differences on cognitive measures are not explained by different stages of development. Rather, these results indicate that a style of thinking rather than stage of thinking underlie the differences. Style of thinking may reflect different contexts that include, but are not limited to, age. Comparing the performance of persons from different

age groups is simultaneously a comparison of different contexts in which the individuals are embedded and each context places different adaptive demands on cognitive abilities.

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Table 1

Means, standard deviations, and significance levels of demographic and performance variables in four age groups[1] (N=333).

| | Age Group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Young N=88 | | Middle age N=82 | | Old N=87 | | Old-old N=76 | | |
| | M | SD | M | SD | M | SD | M | SD | p |
| **Demographic Variables** | | | | | | | | | |
| Age | 20.3 | 1.64 | 44.3 | 3.20 | 65.9 | 2.95 | 80.3 | 4.23 | -- |
| % Female | 52.3 | -- | 53.7 | -- | 54.0 | -- | 55.3 | -- | -- |
| Education | 13.28 | 1.71 | 14.07[a] | 2.73 | 13.88 | 3.03 | 12.73[a] | 3.84 | .05 |
| Health | 5.93 | 1.74 | 6.34[ab] | 1.67 | 5.18[a] | 2.29 | 5.18[b] | 2.23 | .01 |
| Depression[2] | 14.70[ab] | 9.12 | 10.75 | 9.67 | 10.28[a] | 7.68 | 10.36[b] | 7.94 | .01 |
| **Performance Variables** | | | | | | | | | |
| Digit Span | | | | | | | | | |
| Forward | 8.73[a] | 2.36 | 8.00 | 2.37 | 7.77 | 2.15 | 7.10[a] | 2.28 | .001 |
| Backward | 7.15[a] | 2.08 | 6.34 | 2.44 | 6.47 | 2.08 | 5.75[a] | 2.26 | .005 |
| Letter Sets | 20.20[a] | 5.13 | 17.03[a] | 5.68 | 12.10[a] | 5.84 | 7.31[a] | 4.05 | .001 |
| Vocabulary | 49.54[a] | 12.20 | 56.25[a] | 11.52 | 54.52 | 12.65 | 53.60 | 12.93 | .01 |
| Logical Reasoning[3] | 2.85[a] | 1.48 | 2.46[b] | 1.56 | 2.05[a] | 1.43 | 1.57[ab] | 1.24 | .001 |

[1]Means with the same superscript are significantly different at the .05 level.

[2]Higher numbers indicate higher self-reported depression.

[3]Scores could range from 0 (experiential; no isolation of variables) to 4 (logical isolation of the operative variable and exclusion of the inoperative variables).

# Proportion of Divisions Type by Age Group